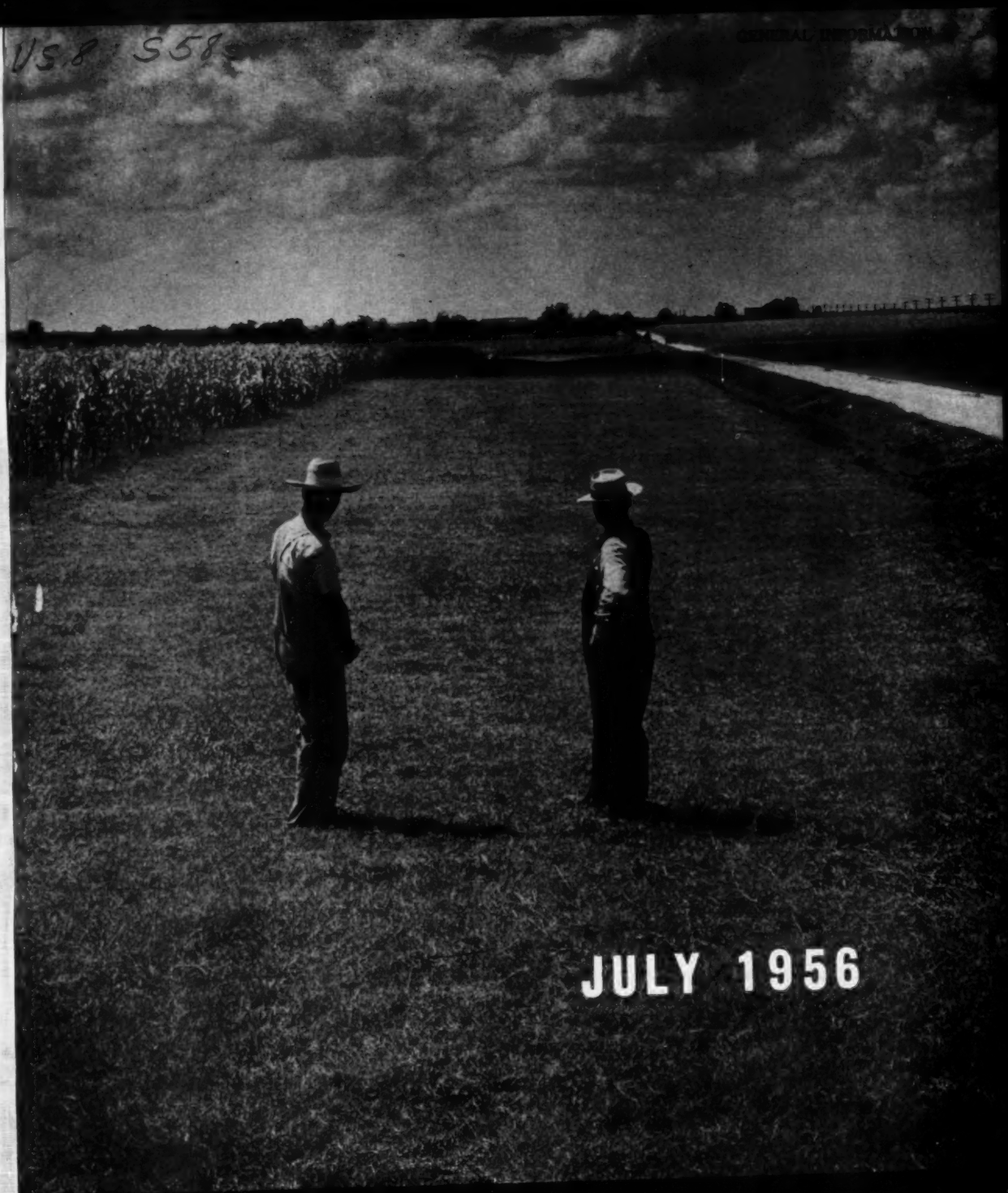

JULY 1956

SOIL CONSERVATION

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SOIL CONSERVATION

JULY 1956
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★ THIS MONTH ★

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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PHOSPHORUS FROM THE SUBSOIL.—Experiments with radioactive phosphorus show that corn can get more phosphorus from the subsoil than previously believed, according to tests conducted by John Murdock and L. E. Englebert, University of Wisconsin soil specialists.

They report that corn can get from ½ to ⅝ of the phosphorus it needs from below the plow layer if phosphorus is present in available form. The soil type and weather conditions make a difference, though. Miami subsoils furnished 53 percent of the phosphorus, Dodge subsoil gave 55 percent, Parr subsoil gave 77 percent, and Kewaunee subsoil gave 80 percent of the phosphorus that the corn plants used.

The soils specialists determined phosphorus uptake by placing a radioactive form of the element at 6-inch depth intervals in the soil down to 3 feet below the surface. The fertilizer phosphorus taken up by the plant then was determined by a Geiger counter. It was found that the 6- to 12-inch layer of the soil contributed the most phosphorus of all the subsoil layers. In general, plants fed less on the phosphorus from the lower subsoil depths.

FRONT COVER.—Waterway, sodded to bermudagrass in Grayson County, Tex., that stabilizes terrace outlets for 40 acres of cropland.

Government Printing Office, Washington 25, D. C. All orders go to the Superintendent of Documents,

Productive Nursery from Wornout Land

By CARL O. CLARK

IN 10 short years Peter and Edmond Mezitt of the Weston Nurseries have literally rebuilt more than 200 acres of wornout farmland into good cropland in Hopkinton, Mass. Since 1948 they have cleared the stone to a depth of 3 feet on a stony drumlin. They have leveled 40 acres of glacial outwash soils, planted crops on the contour, constructed 3 miles of diversion terraces, established grass waterways, constructed outlets, installed more than a mile of drainage tile, and planted cover crops between the rows of nursery stock. This team of father and son are in the business of soil conservation and land improvement in a big way.

Weston Nurseries in Hopkinton came about because Weston Nurseries in Weston, Mass., lost a big chunk of land when the Metropolitan District Commission put an aqueduct across their property, and then a new road took another chunk. Land in Weston became too expensive to use for farming, so the Mezitts started looking for new land. They found it in Hopkinton in several old farms with acreage enough to meet their needs. The big trouble with this land was its wornout, stony condition.

In 1946 the Mezitts bought two war surplus bulldozers and went to work clearing and reclaiming the land. A piece of land would be cleared and planted immediately to nursery stock. By the time the Middlesex Soil Conservation District was organized in 1947, Weston Nurseries was already in trouble with serious erosion on these hillside fields. Many gullies had been formed by rushing water.

Then Peter and Edmond Mezitt heard of Middlesex Soil Conservation District and the possibility of getting technical assistance. A farm conservation plan was completed for their nursery farm in March 1948. The first practices planned and applied were diversion terraces and contour planting. When Edmond and his father saw the results of these conservation practices, they made every effort to get the complete job done as speedily as possible. Eddie bought himself a transit and laid out all his new plantings on the contour, as suggested by the Soil Conservation Service technician in Middlesex District. They dug up old plantings so that key diversion terraces could be constructed, and they planted cover crops of oats and barley between the rows of nursery stock during August and September. By the fall of 1950 erosion was no longer a serious problem.

Peter and Edmond tell of hillside "lakes" which they have created by their contour planting. After a heavy rain, water is held on the hillsides for several hours before it soaks into the ground or finds its way into a safe water disposal system. The Mezitts say that visitors have marveled at what appeared to be a lake on their steep hillsides. All because of the water

Edmond and Peter Mezitt handle one of their prize azaleas.

Note.—The author is work unit conservationist, Soil Conservation Service, Concord, Mass.

Nursery stock planted on the contour on the Weston Nurseries.

retained by contour rows of nursery stock. Eddie says, "We need this water to grow our crop. We have found that this Paxton soil in Hopkinton, contour planted, will grow a crop of nursery stock in about one-half the time required on our Weston farm. Water conservation is just as important to us as soil conservation. In fact, I do not believe that you can successfully divorce one from the other."

The Mezitt's Weston farm is still in operation, but they are gradually moving all their operations to Hopkinton. In 1950 they bought another farm in Hopkinton consisting mostly of glacial outwash. This farm was pockmarked with holes and knolls which made farming rather difficult. Crops on the knolls would not grow because of drought, and crops in the holes had wet feet. By this time Weston Nurseries owned several bulldozers, so they started leveling this whole farm. They do this by stripping the topsoil off a large area, leveling the subsoil, and respreading the topsoil. Eddie says, "Even though we had no topsoil on the knolls, it ran as deep as 6 feet in the holes. When we get a piece completely leveled, we find that we have from 18 inches to 2 feet of topsoil over the whole area."

The problem of maintaining organic matter in nursery soils became more and more apparent to Peter and Eddie, so in 1951 they bought a wood chipper that they use in their clearing operations. When they cut off an area now to clear for cropland, they chip all the brush and treetops. They find it faster than burning and they have a lot of valuable organic matter that they can use in their nursery.

Paxton soils, which predominate on the uplands of the nursery, are underlaid by hardpan and are usually full of seep spots. Diversion terraces may take care of these seep spots and areas, but it was found necessary to supplement diversions with tile drains in some spots. In 1955 more than a mile of tile drains were installed, and plans have already been made to put in at least another mile in 1956. These tile lines are laid at an average depth of 4½ feet and spaced about 50 feet apart. A gravel bed is made for the tile and the tile is covered to the top of the hardpan with more gravel. This allows surface water to make its way down into the tile. The 1950 installation turned a poorly drained field into a field that is well drained.

The ownership and management of Weston Nurseries combine outstanding professional training, experience, and business acumen. Peter Mezitt and his wife were born in Latvia and attended a horticultural school in Czarist

Russia. During a number of years after his coming to America, Mezitt gained valuable experience while working as gardener and foreman on estates near Boston. But all the while, he had his mind set on starting a nursery of his own, which he did in Weston a little while before the depression of the thirties.

Edmond, the son, grew up in the nursery business and topped practical experience with professional training in landscape architecture, in which he was graduated at Cornell University in 1938. Father and son have developed one of the largest and finest nurseries in the Northeast, that does an annual gross business valued at $350,000 to $500,000.

Diversion ditch on Weston Nursery.

Ridge Farming for Erosion Control

No. 15

This is the fifteenth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By W. F. BUCHELE, E. V. COLLINS, and W. G. LOVELY

AGRICULTURAL scientists are continuously seeking tillage systems which embody the best soil and water conservation principles without sacrificing yields. To be acceptable a system, in addition to providing year-round protection for the soil, must assure adequate yields and provide for efficient use of labor and machinery. In their attempt to find such a system United States Department of Agriculture and Iowa Experiment Station agricultural engineers and agronomists have been studying tillage systems.

Note.—The authors are agricultural engineers, Agricultural Research Service of the U. S. Department of Agriculture and the Iowa State Agricultural Experiment Station, Ames, Iowa.

Such questions as follows are still asked of each system: Does the system control water runoff? Does the tillage system prevent soil erosion? Does the system provide for above ground water storage? Does it prevent soil blowing? Can it work on slopes and flat ground?

One of the most promising tillage systems developed has been called ridge farming. This system is somewhat similar to contour listing except the crop is planted on the ridge instead of in the furrow. By planting on top of the ridge the best features of listing, bedding, and conventional farming are combined.

A review of corn production literature shows that Jones and Beasley at the Missouri Experiment Station experimented with ridge farming for 3 years starting in 1938. Yields were low but this was offset in part by lower requirements in power and labor. The experiments were abandoned due to lack of machinery to construct ridges and to cultivate and control weeds on the ridge.

Contour listing has been used for a number of years in western Iowa and eastern Nebraska. Experiments in western Iowa show that contour listing reduces soil loss to ⅓ and water runoff to ½ that of surface planting.

Ridge farming as now practiced consists of planting on contour ridges, preemergence spraying to control early weed and grass growth, and mechanical cultivating to control late weed and grass growth. The ridges are maintained throughout the year and all cultivations are conducted to maintain or increase the size of the ridge.

Many new herbicides have been developed that show promise for controlling weeds in row crops. Several years of experiments in Iowa, using 2,4-D as a preemergence spray application, have indicated that it gives excellent control of early annual grasses and broad-leaved weeds. This spray applied at planting time retards the growth of annual grasses and prevents the growth of susceptible broad-leaved weeds for a period of 4 to 6 weeks.

Experimentally a 5 year rotation of corn, corn, oats, meadow, meadow, has been followed on ridges. This is feasible if the small grain and meadow crop can be direct harvested. Two years of corn grown on ridges with small grain and meadow crop flat planted is practical because the ridges can be leveled with one pass of disk cultivator by setting the disks to throw out, or with two passes of a tandem disk used in the conventional manner.

The laying out of the ridges is of special importance as they will be maintained throughout the year and possibly for two or more years. If the field has already been terraced then it is relatively simple to lay out the ridges. They are formed starting at the top terrace ridge and working down the slope parallel to it. At the end of the row the ridges are turned down the hill and the return pass is made parallel to the first ridges. When the lower terrace channel is reached the ridges are ended in the terrace channel. The terrace channel is seeded to grass in areas where it is used for turning. A seeded or surface planted area is required at the row ends for turning purposes. Existing waterways are used in this layout.

A field of mature, ridge farmed corn.

If a field has not been terraced a contour or graded line is located at or near the top of the slope. If the line is on the contour it should be located as close to the top of the hill as possible. A 3 to 5 foot vertical interval is permissible from the top if a .4 to .5 percent graded line is used and if reverse grades do not occur in the furrows constructed above and parallel to this line. If reverse grades are found in furrows, less vertical distance between contour control lines is used. Use is made of all natural waterways and new waterways are established to have a turn strip at row ends to avoid turning machinery across the ridges. This turn strip may be a waterway, a grassed area, or a surface planted area.

A rope is used to walk in a parallel line with a 5 to 7 foot vertical interval down the slope from the top graded or contour line. If the grade of this line is too great, (4 inches of fall in a row 100 feet long is considered maximum) a shorter vertical interval is used by moving up the slope.

After the new contour or graded line is laid out, a 30-foot grass correction strip is established below it. Ridges are constructed below and parallel to the lower side of the grassed strip. This process is repeated until the bottom of the slope is reached. All row ends are turned down the slope to avoid catching runoff water. All short rows are ended on the lower correction strip.

The ridge farming system has been used on three farms on a field basis. Sufficient waterways and correction strips were used to prevent excessive grade in the furrows, break up row length, and give good control of the water. The correction strips provided a convenient place for turning when short rows were encountered. The number of correction strips used on long slopes varied from 2 to 4, depending on the terrain.

Ridges may be constructed with a disk culti-

Water standing in contour ridge farmed field after 1½-inch rain.

vator or a plow. If a disk cultivator is used the field is first plowed and the ridge formed with two 16-inch disks operating on each side of the bed. After the first pass has been made over the entire field the center two 16-inch disks are removed and replaced with 12-inch disks. Another pass is then made over the field to increase the height of the ridges. Sweeps may be used in the furrows on both the first and the second pass to plow out the soil left by the two center disks and to loosen the soil in the furrows so that the soil may be easily moved during succeeding operations.

If the ridges are constructed with a plow, the bottoms are arranged so that 1 furrow slice is inverted onto an undisturbed strip approximately 2 furrow slices wide. With the proper tractor wheel spacing, uniform ridges can be constructed on 40 or 42 inch centers. The furrow walls are used as a guide for the tractor wheels. Wide front end tractors are easiest to use for this operation. Nearly all plows can be modified to make ridges. With this method of constructing ridges approximately one-third of the land is plowed. However, it is usually necessary to make one pass with a disk cultivator to break up large clods, shape the ridges, and control weeds prior to planting.

If the ridges are formed in the fall, they may need another disk cultivation in the spring. This operation should be made near planting time so that early weeds that have germinated in the ridge before planting will be controlled.

Forming the ridges in the fall helps catch snow and provides above ground storage of water until the soil has thawed sufficiently to absorb the water which accumulated from winter rains and melting snow. A 10-inch ridge on level land will have approximately 5 inches of above ground water storage capacity. On sloping land with irregular layout, however, this storage capacity is reduced to 1½ to 2 inches of water.

The ridges are planted either with a centrally mounted planter equipped with single disk furrow openers or a trailing planter with disks to hold the planter on the ridges. The disk furrow opener cuts through any trash found in the ridge. (Stalks caught on a stub runner will scrape off the top of the ridge and reduce the height of the ridge.)

If the soil is dry the planter is run into the ridge deep enough to place the seeds in moist soil. The height of the ridge must often be reduced in order to do this. The conventional open centered press wheel has been satisfactory

for firming the soil over the seed.

After planting, the entire land surface is sprayed with 1½ pounds of 2,4-D ester mixed with 10 gallons of water. This preemergence spray may be applied at time of planting or at any time until the corn plants emerge. Spraying after the corn has emerged will often cause serious damage to the corn plants and reduce yields. The 2,4-D provides effective weed control until the corn is about a foot high.

The annual grasses that have been stunted by the 2,4-D spray will begin to recover 4 to 6 weeks after spraying and make rapid growth. A cultivator equipped with disks should be used at about this time for the first cultivation. Because of the height of the corn this cultivation may be performed at high speeds. The disks are set to throw the soil up hill onto the ridge and are staggered for better weed control. A second cultivation may be necessary, depending on the extent of weed infestation. If used, the front disks are moved further apart in order to prevent root pruning. For all cultivations sweeps are used in the furrows to plow out tractor wheel tracks and loosen the soil for maximum water infiltration.

Physical and chemical measurements were made of the soil and the root bed of ridge farmed corn. These measurements were compared to flat planted, and lister planted corn. The temperature at seed depth at planting time

Ridge plowing with 4-bottom plow that has the 2 center bottoms removed.

A four-row, variable width ridge making unit used on sloping land.

was found to be slightly higher in the ridge than on the flat surface and from 3° to 6°F higher than in the lister furrow. The moisture content of the ridge was found to be less than flat planted or listed corn at the seed level; however, at greater depths the ridge had a higher moisture content than either the flat surface or lister furrow. The bulk density of ridge and lister furrows were approximately the same throughout the soil profile. The traveled furrows between ridges were found to be much higher in bulk density than that of the lister furrows or untraveled furrows. The available nitrate content of uncultivated soil samples was higher from the ridge than from the flat surface or the lister furrows.

Observations were made on the differences between the infiltration capacity of traveled and untraveled furrows. Wide front end tractors were used in the farming operations. Although water may flow horizontally from a compacted furrow to an uncompacted furrow and in that manner flow into the soil, the fact still remains that the only water loss from the ridged field was lost from the traveled furrows. This plot was compared with an adjacent flat planted plot. While no water was found standing in the sloping flat planted field, three areas were found where erosion had occurred. The erosion had washed out numerous hills of corn, reducing the stand and carrying soil from the field.

Another benefit is gained from the efficiency

of tractors operating on graded or contour rows. Operating the tractor on the contour permits maximum loading of the tractor in that the tractor does not have to pull itself up hill and then coast, so to speak, downhill under its own weight. The ridge-furrow combination provides an accurate steering guide for machinery operations. The front wheels of the tractor tend to follow the furrows. The ridges prevent sidehill slippage of the tractor during cultivation. This minimizes the careful attention normally required for the first cultivation of contour rows and permits higher operation speeds in later cultivation. Often it has been observed that good emergence has been secured on contour flat planted slopes; yet, the difficulty of steering on loose soil on sidehills has resulted in the plowing out of many corn seedlings.

Making the ridges with the disk cultivator or plow permits the accumulation of topsoil in the seedbed. This is especially beneficial in thin land.

Disk cultivator set to cultivate ridge farmed corn.

On level poorly drained land the elevated seedbed of the ridge provides a certain amount of protection against drowning of the crop during flooded conditions. Furrows opening into drainage ways provide a drainage ditch 4 to 5 inches below the normal soil surface. Drainage problems occur most often in soil depressions or on relatively flat land. Ridges located on the sides of a low area prevent accumulation of excess water in this depressions by preventing water from flowing into the depressions. On level land the height of the seedbed helps to avoid drown outs because, even if the land is flooded, the period of drowning is reduced because the top of the ridge emerges first after the water recedes. The reduction of the drowning period prevented drowning of ridge planted crops during the 1951 and 1954 crop years.

In a number of sloping fields, however, overtopping of the ridges during heavy rainstorms was observed. In areas where back slope occurred, the water accumulated in the furrow until water began to run over the top of the ridge into the next lower furrow. This overtopping occurred successively downslope, causing the eventual failure and washout of a number of ridges. The soil washed from a ridge was found deposited in the next lower furrows. The ridges successively failed downslope until a furrow or a number of furrows were reached that had good drainage to a waterway. When these furrows were reached, the water flowed to the waterway and failure of the entire slope was prevented.

Experience has indicated that the ends of the row should be turned downslope to provide drainage of the furrows into the waterway. If the furrows are not turned downslope then when the ridge forming equipment is pulled out of the ground, a pocket is formed which prevents drainage of the furrow during heavy rains.

During the development of the ridge farming system, yield data were collected. In general, the yield of ridged and flat plots have been approximately the same. There was a greater difference in yield during the first years of development than in later years. In some areas where listing is recommended, the yields of ridged and listed corn have been approximately the same. Where listing is not adapted, however, yields of listed corn have been below yields of ridge planted corn.

SOIL STEWARDSHIP.—Reports from Alabama show that 499 sermons were preached on soil stewardship during Soil Stewardship Sunday in 1955, with an approximate attendance of 46,049 people. In addition, numerous news articles were published and radio broadcasts presented.

Grass More Profitable Than Corn

By JOSEPH F. JELINEK

"IN a couple of years I won't be planting any corn on my farm. I plan to seed most of my farm to native grasses." This is the statement of Harold Hummel, a southern Nebraska farmer who owns a half-section of moderately rolling upland in a traditional corn and wheat producing area.

He signed up as a cooperator of the Jefferson County Soil Conservation District in 1946, and became interested in planting switchgrass after the Soil Conservation Service conservationist urged him to try to raise some. He began by planting 7 acres of Nebraska 28 (certified strain) in May 1949.

The grass was rather slow in getting started, but he cut his first seed crop in 1950, harvesting 100 pounds to the acre. His yields continued to improve and in 1953, his yield was 523 pounds. His average yield for 5 years (1950-54) was 293 pounds per acre. He sold most of this grass seed for about $1 per pound. His yield in 1955 was cut to 100 pounds per acre when the area received only about half of normal rainfall.

Harold now has 40 acres of switchgrass and 6 acres of Indian grass. He plans to plant 10 more acres of certified Kaw bluestem and 10 acres of Elreno side-oats grama.

Hummel plants his grass in 40-inch contoured rows on terraced fields. He uses a grain drill for seeding by plugging some of the holes.

Curing the native grass seed is an important step in being a successful seed producer, he says. Harold built his own seed dryer in his machine shed. The dryer has a 10-ton capacity.

Besides being a successful native grass producer, Hummel has applied a conservation plan to his farm which is complete in almost every detail. He has constructed approximately 10 miles of terraces and seeded 15 acres of waterways to grass. Two farm ponds have been constructed.

In his opinion, mechanical practices must be supplemented by good farming and soil conserving rotations. The tilth of the soil is important for proper water penetration. Through the use of legumes, commercial fertilizers, and plowing back the residues from each crop, his soil is highly fertile and permeable.

Heavy rains do not cause Hummel much anxiety. During the last 3 years the runoff has been almost negligible. Actual physical proof of this statement is visible by examining the farm pond he built in his wildlife area. The pond was constructed in 1947 with a drainage area of approximately 60 acres of cropland. Hummel said that without land treatment the pond had plenty of water in it. He has observed that as he builds more terraces and improves the tilth of the land, he notices less and less

Switchgrass and Indian grass plantings on the Hummel farm.

Note.—The author is soil conservation aid, Soil Conservation Service, Fairbury, Nebr.

Harold Hummel viewing a wildlife planting of redcedar on his farm.

runoff. The ordinary 2- or 3-inch rains on his place result in hardly any runoff. Siltation has been reduced to the point where there is almost none. The pond is dry at present, and Hummel doesn't expect any water in it unless exceptionally heavy rains occur.

Considerable irrigation activity has been started in the western edge of Jefferson County. Harold became interested after examining the ground water survey map with Marvin Hollingshead, SCS work unit conservationist. The survey showed favorable conditions, so a well was put down. A good well was obtained, delivering about 1,200 gallons per minute. Land leveling was done last fall and a contour-row irrigation system was established.

"I am going to be shooting for 500 pounds of switchgrass per acre," comments Harold. "With a dependable water supply and fertilizing, I shouldn't have any trouble making it."

The farm also has an excellent wildlife area covering approximately 4 acres. This was established in 1947. Improving wildlife habitat is the best way to increase the game population in this area," he says. "I know it is true since I have observed the results on my own farm."

Harold has served for 5 years on the Nebraska State Game Commission. He has been interested in improving the habitats over the State and is a strong supporter of watershed programs. He strongly favors establishing wildlife habitats, wherever feasible and practical, around the immediate areas of the dams built in watershed protection programs.

He will retire from the commission this spring as required by law. The winter issue of *Outdoor Nebraska,* official publication of the Nebraska Game, Forestation, and Parks Commission, paid him this tribute. "Harold Hummel, the immediate past chairman of the commission, as well as the outgoing commissioner this year, qualified well under the new law. Mr. Hummel not only lives on his own farm, but—as proven by his Master Farmer awards and other recognitions—practices all the newer methods of soil and wildlife conservation. Mr. Hummel brought to his official commission work this spirit of developing farmer cooperation in assisting wildlife management programs on the farms of Nebraska."

FARM SAFETY WEEK.—The 13th National Farm Safety Week will be July 22-28, 1956. Sponsors are: The National Safety Council, the U. S. Department of Agriculture, and other cooperating State and local agencies. The principal slogan is, "Safety Pays All Ways."

Water for Thirsty Azaleas and Camellias

By JAMES E. McDONALD

IF you had 300,000 thirsty azalea and camellia plants and only a 2-day supply of irrigation water, what would you do? Norwood Hastie, owner of Magnolia Gardens, near Charleston, S. C., found himself in this predicament during recent droughts. For the first time in the 200 years of the Gardens' existence, the irrigation ponds were almost dry.

In this emergency, Hastie called on Soil Conservation Service technicians in the Charleston County Soil Conservation District for help. Within a few hours, his water needs and potential water supply were investigated by the local SCS soil scientist and engineer. Two plans were devised: one for his immediate needs, the other for his future water requirements.

The solution to his emergency problem could have come from Ripley's "Believe It or Not." Heavily traveled State Highway 61 separates Magnolia Gardens and the woodlands of a lumber company. About the turn of the century the woodland area had been clean cut and turned upside down for the digging of phosphate rock. High, wide, and mile-long windrows of earth were left. Long, deep, narrow ponds formed between the windrows. Over the years trees reseeded in the area, but the ponds are still there. Despite the drought they contained a

Note.—The author is soil scientist, Soil Conservation Service, Charleston, S. C.

Irrigation of young camellia plants at Magnolia Gardens.

Water being pumped from seepage ditch (above) into irrigation storage pond (right).

few feet of water. An emergency supply of water was thus found; but problems piled up. Could the water be used? How to get it across the highway and into Magnolia's ponds? Where to get extra irrigation pipe and a pump?

Putting first things first, Hastie called the main office of the lumber company, a hundred miles away, and obtained permission to use the water. Next he obtained permission from the State Highway Department to trench the busy highway, lay and cover a 4-inch conduit pipe, and keep traffic rolling, all in the space of a few hours.

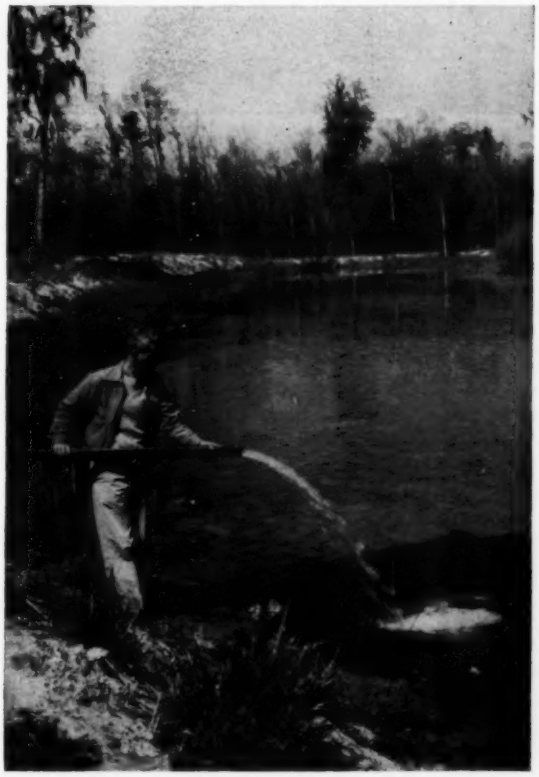
Meanwhile, 1,500 feet of irrigation pipe and a high capacity pump were needed to pull the water up out of the woods' ponds and pump it to a ditch that ran into Hastie's nearest pond. Another call, this time to Newman Buck, chairman of the Charleston County Soil Conservation District, and owner and operator of a large vegetable and cattle farm, 16 miles away. Buck had the pipe and a pump. Within a few hours, piled high on a truck, pipe and pump were on the way to Magnolia Gardens.

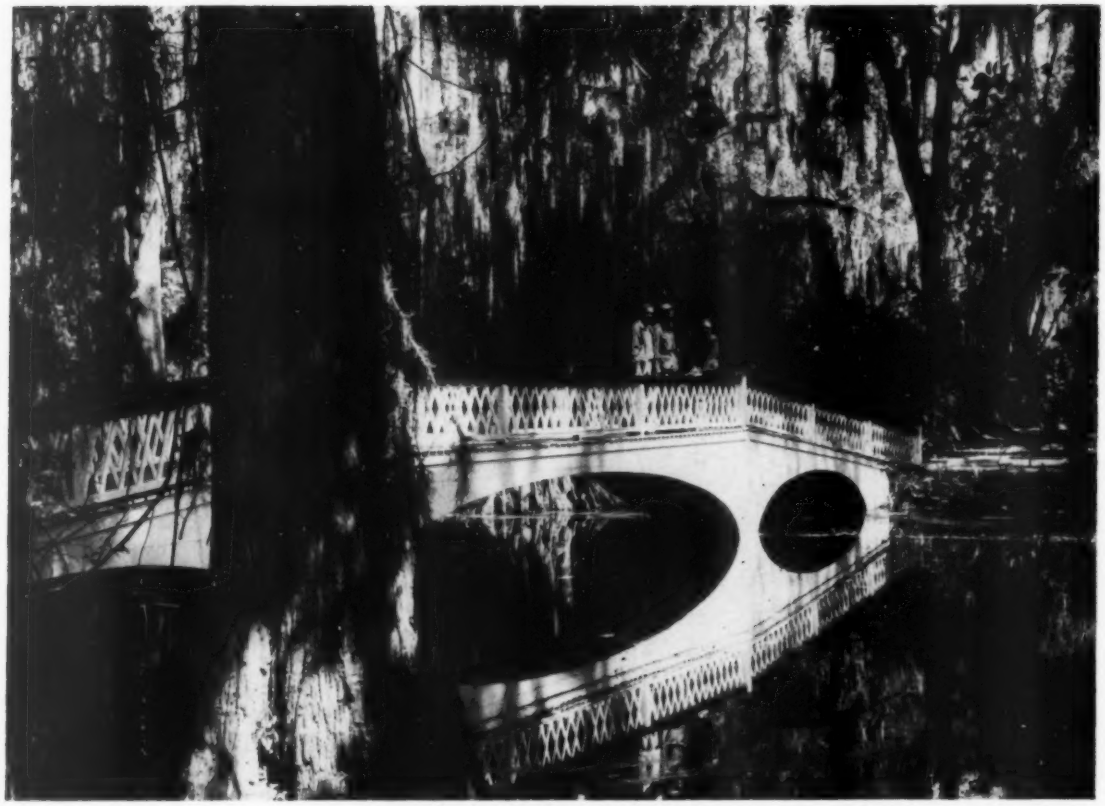
By now the sun was setting and only 1 day's supply of water was left. Work continued on into the night to beat the sunup deadline and get water to the valuable plants before Old Sol could further wilt and cook them.

After many hours of hard work everything was ready. The motor was cranked up, splitting the silence of the woods with a mighty roar. The suction pipe shook and took hold, water sucked up through the pipe, under the road, and raced to the ditch and into the pond.

As the water level rose the Magnolia Gardens' pumps started and the life-giving waters rained down on the thirsty plants. The deadline had been met and the emergency was temporarily over.

But plan two still remained to be carried out. Magnolia Gardens needed a permanent long-time supply of water. The SCS soil scientist and engineer made borings by hand and power





Scenic view on Magnolia Gardens.

auger in several areas in an attempt to locate an underground strata of water-bearing sand. The results were discouraging, only thick layers of clay and soft marl could be found.

One area at the base of a clay slope showed promise. Borings struck a sand layer that yielded some seepage water. A chance had to be taken, so a deep seepage ditch was dug by dragline along the base of the slope. Slowly the water seeped out and ran down the ditch to a sump hole. Each morning, often before sunup, the precious water was pumped to a small pond and doled out to the ever thirsty plants.

When the seepage ditch was finished the dragline began digging a storage pond in a low clay area of the Gardens. Ordinarily the area would be covered with 2 feet of water but now it was bone dry clear down to the bottom of the 8-foot hole. As the hot, dry summer wore on, every bit of extra water was pumped into the new pond. By winter, aided by Hurricane Hazel, the pond was full.

Meanwhile, Hastie put down a 700-foot test well in a search for more water. The log indicated a vein of water at about 400 feet but a salinity test showed it to have 880 parts per million of salt, making it unfit for irrigating the tender plants. So the test hole had to be abandoned.

More recently, the 200-year-old ponds were deepened and drainage ditches opened up to lead any runoff from the land into the ponds. Outlets to the Ashley River, a salt water river, were blocked so that no water could escape from the land. Rainfall, more than in the previous year, but still not up to normal, was held in the soil by mulching practices. Seepage was caught and stored in the ponds.

By observing and checking the salt content of the high flows in the salty Ashley River, Hastie found that heavy rains upstream some-

times lower the salt content of the river. This occurs when high flows of fresh water from heavy rains flow by Magnolia Gardens on the low ebb tide of the river. When the salt content is low enough, he pumps water out of the river into his ponds. Using the river water is a risk he is willing to take to get irrigation water.

Magnolia Gardens has not completely solved its water problems but, with the aid of the Soil Conservation Service technicians in the Charleston County Soil Conservation District, emergency problems have been met and partial long-time needs solved.

A pond on Magnolia Gardens into which water is pumped from Ashley River during low tide.

PROFIT IN TREES.—W. E. Barlow of Bluff City, Ark., planted 4 acres to pine seedlings in 1942. At the time of planting Barlow stated the land was worth about $5 per acre. After 12 growing seasons, in 1954, the area was spotted for the first thinning. Barlow did his own work and netted $60 per acre from this area, and says now he would not sell the land for $100 per acre.

W. M. Glass of Route 6, Prescott, Ark., planted 5 acres of pine seedlings in 1942. After 11 growing seasons, in 1953 he made his first thinning. Glass did his own cutting and averaged $50 per acre on the thinning.

DISTRICT PROFILE

KENNETH CONRAD of COLORADO

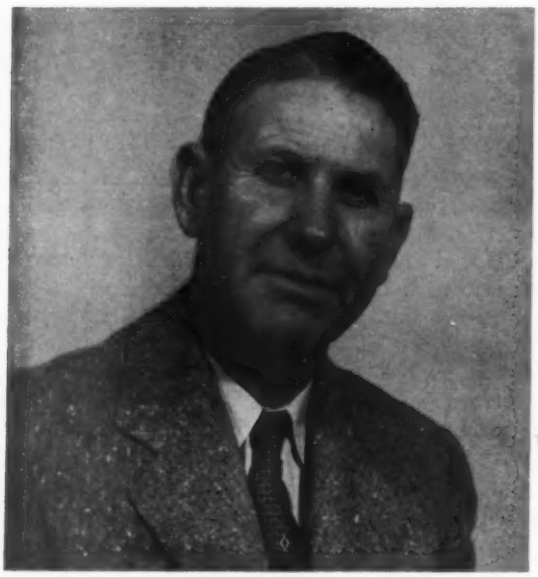
GOOD grass and good cattle to make use of it are Kenneth Conrad's ideas of successful ranch operation. Because of his enthusiasm in promoting these principles, as well as applying them on his own ranch, Conrad's name has become widely associated with good range management and soil conservation.

Kenny purchased a ranch in the sandhills northwest of Wray, Colo., in 1943. Several smaller units that were mainly devoted to dryland farming were purchased later to block out the ranch, which now takes in about 14,000 acres. Marvin Kniese, a graduate of Colorado Agricultural College, was employed as ranch manager and he and Conrad began a program of range and livestock improvement. Kniese is now operating a ranch of his own east of Wray.

In 1951, the ranch was added, by petition, to the Northeast Yuma Soil Conservation District and a conservation plan was developed. A great deal of native range improvement was already underway at that time and some reseeding of abandoned cropland had been done.

Much of the cultivated land had been severely eroded by wind. An extensive reseeding program was put into effect. More than 1,100 acres have since been seeded to grass and grass-legume mixtures. None of the land is now cultivated. Over 600 acres have been planted to sand lovegrass—most of it in a mixture with sweetclover and alfalfa. Smaller acreages are planted to side-oats grama, Blackwell switchgrass, and native bluestem. Cool season grasses with alfalfa were used in the latest seedings which include intermediate wheatgrass, tall wheatgrass, and smooth brome. Good stands are established on most of the seeded area and they make up a valuable part of the grazing capacity of the ranch.

Seasonal use of native range has been rotated over the ranch to give each pasture as much rest as possible during the growing season. This has brought about a marked increase in the tall



Kenny Conrad.

sandhill grasses and a much higher production of forage. The past few years have been dry but grass production on the ranch has held up remarkably well. Kenny's slogan in regulating use of pastures is, "Watch the grass and watch the cattle." A flexible operation is followed so that cattle do not remain on any pasture until the grass is overused.

An intensive breeding program has been followed, along with the range improvement, in an effort to get the highest sustained production of beef per acre and cow unit. Individual production records are kept on the cow herd.

Conrad has served on the board of supervisors of the Northeast Yuma Soil Conservation District for 3 years and is now president of the board. He has been a national director of the American Society of Range Management, in which he has been active for several years. He is active in the Yuma County Livestock Association and has served as president of that organization. In 1954 he was instrumental in organizing a "grass school" for ranchers in Yuma County and surrounding areas which was well attended.

The Conrad ranch was one of three places entered by the Northeast Yuma Soil Conservation District in the Denver Post-KLZ Soil Conservation Contest in 1952. The district was state winner that year and the Conrad ranch received the highest rating of any individual unit.

Kenny is a native of Yuma County, his father being an early settler. He and his wife have three boys, Joe, the oldest, is attending Colorado Agricultural College, and Mike and Chris are in high school at Wray.

—T. E. MULLINGS

Trees For Eroded Land

By CLARENCE L. DANIELS

A group of 67 Negro farmers got away to a fast start in the Johnson Creek watershed in Tennessee. The watershed work plan had been completed, but federal funds for structural work were not yet available. They didn't wait for the Federal Government to take the initiative.

Note.—The author is work unit conservationist, Soil Conservation Service, Jackson, Tenn.

Handy Reid receiving pine seedlings for planting on his farm from C. E. Burger and B. F. Headden of the Soil Conservation Service.

Planting pine trees on gullied land in the Johnson Creek watershed.

The group planted 150,000 pine trees last season on 150 acres of gullied land in the upper part of the watershed as one of the first phases of the 5-year program planned by the supervisors of the Madison County Soil Conservation District and the directors of the Johnson Creek Watershed District. Altogether there are 1,657 acres of gullied land that need to be planted to pines.

Knowing the economic condition of the group and the severely eroded condition of their area, the supervisors decided to develop a special program to fit their needs and desires. They asked the ASC County Committee to give special financial assistance for a tree-planting program in the area through the Agricultural Conservation Program.

During the discussion, it was brought out that very little, if any, ACP money had been earned in the past by farmers in this area. The county committee became interested and allotted $1,500 of regular ACP money for planting pines in the watershed. Meanwhile James F. Hughes, SCS technician working with the group, had laid the groundwork by explaining the watershed program and the plan the supervisors had in mind.

The supervisors told the group that they would buy the trees at $3 a thousand and deliver them to cooperators' farms. Then when the trees had been properly planted, the supervisors would pay them $7 a thousand. In so doing, $10 was spent for each acre of gullies planted to pines. This was the full ACP payment. In return, the cooperators participating assigned the ACP payment to the supervisors through a pooling agreement.

Cleo Reed receives a check from K. J. Johnson, soil conservation district supervisor, for having planted several thousand pine seedlings on his gullied land, while his neighbors look on.

When everyone agreed to the supervisors' proposition, the plan was put into operation. Supervisors borrowed the needed $1,500 from the Production Credit Association to finance the deal.

Another need on the low-income farms of the 22,610-acre watershed is winter cover for corn and cottonfields. The district encouraged the farmers to pool their resources to solve this problem. And last summer, 20 of these cooperators pooled land, labor, and money to sow 30 acres of oats and vetch for seed production. When the crop is combined this summer, seed will be divided equally among the 20 farmers. They in turn will plant the seed and combine a part of the seed produced on individual farms.

Everyone concerned feels good about the start made by these farmers with the help and encouragement of others. And here's why: (1) some 150 acres of gullies have been set to trees, (2) these low income farmers earned $1,050 for labor during the winter months when most of them were not working, (3) the people now have a much better understanding of the purpose of the Agricultural Conservation Program and know how to use it, (4) the people now know that the supervisors want to help them and they will cooperate much better with future programs, and (5) the supervisors and technicians are encouraged and now realize that a long-range program will be of great help to these people and that true conservation farming can be achieved.

Range Pitter Gets Results

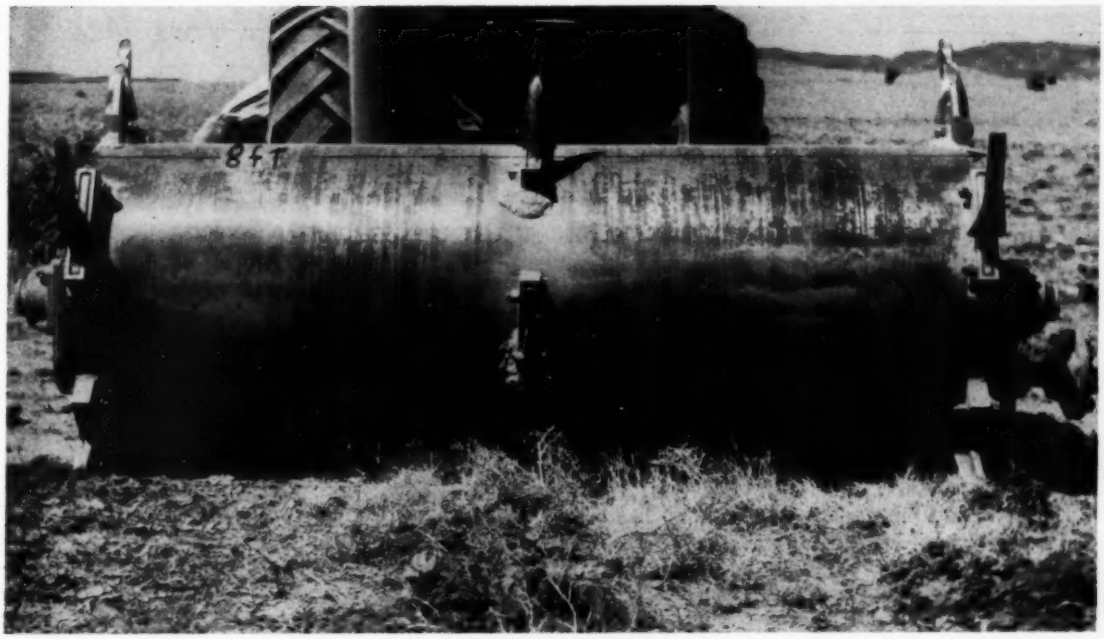
By C. S. FONTE

THE dry seasons of the past 5 years in eastern Colorado have caused a sharp decline in range condition and forced many ranchers to take a critical look at their rangelands and search for measures to relieve this condition. Some ranchers have recognized their problems and are trying to do something about them. One such case involves ranchers of the Central Colorado Soil Conservation District.

Realizing that much of their rangeland was in fair to poor condition, they knew that when it did rain they lost most of the moisture that fell. They found that on the poor ranges the surface of the soil was sealed over and turned water as if it were the roof of a house. It would take several minutes after moisture was applied to the surface of the soil before it would soften up and take moisture. Then a more enlightening fact was discovered. After the surface was softened up, water still penetrated into the soil very slowly. On many soils, 8 to 12 inches below the surface, there was a parallel platy condition that kept the water from penetrating deeper into the soil. This was on medium and heavy textured soils. Neither the platy condition nor the sealing over of the surface was found on sandy soils. Therefore, sandy soils did not present the problem of getting moisture into the soil. In an effort to remedy these two soil conditions on poor and fair range

Pitting is more effective if done on the contour, especially if the slope is 5 percent or more.

Note.—The author is range conservationist, Soil Conservation Service, Colorado Springs, Colo.



Range pitting machine.

conditions of the medium and heavy soil textures, the ranchers of the Central Colorado Soil Conservation District procured a machine called a range pitter. This is a custom made machine that consists of a steel drum 8 feet in length and 3 feet in diameter with 15 teeth, 3 rows with 5 teeth in each row. It is a large machine made entirely of metal and weighs approximately 5 tons. The teeth are 14 inches long and 4 inches wide. A large farm tractor is needed to pull this machine. The machine does a better job of breaking up the hardpan (platy condition of soil in top 8 to 14 inches) when operated at a rate of 4 miles per hour. The machine makes more than 5,000 pits to the acre. Most pits will fill to the surface of the ground with 3½ gallons of water; however, some will take as much as 5 gallons to bring the water to the ground level.

It is more effective to operate the machine on the approximate contour for two reasons: first, the machine, weighing 5 tons, takes less power to pull on the contour than up and downhill; secondly, the pits made on the level are more effective since the length of 8 to 10 inches is across the slope rather than the width of 3 to 4 inches.

In measuring the effect of this pitting on a one season basis, it was found that on a clay loam soil which was treated by this machine, moisture penetrated to a depth of 19 inches from a 2.5 inch rain as compared to 7 inch penetration on an untreated area. The effect of keeping this moisture on the land is reflected in increased growth of vegetation. On these clay loam soils with a fair stand of grass, the production was increased from 500 pounds per acre on the untreated area to 1,000 pounds per acre on the treated portion. This was accomplished with a little less than normal rainfall following 4 years of drought. There was 3.18 inches of rain in the 4-month growing season. Species of grass were galletta, blue grama, three-awn, and western wheatgrass.

On not quite as heavy a soil with nearly a pure stand of blue grama, the effect was not so great. The untreated area yielded 400 pounds per acre while the pitted area yielded 500 pounds per acre—only 100 pounds more. These production weights are all in the same local area of rainfall.

In this same area with practically no vegetative cover, only scattered blue grama plants of low vigor, there was only slight effect on the

grama plants. But a good stand of annual weeds was produced that will hold snow and help prevent wind erosion through the winter and spring months.

The ranchers who have used this machine are very pleased with the results that have been obtained in one season's operation. There are a few suggestions on which all concerned are in agreement:

(1) Use the machine only on soils of loam or heavier texture.
(2) Do the pitting on the contour.
(3) Use the machine only on range in fair or poor condition.
(4) Since moisture penetration is generally satisfactory on good and excellent condition range, pitting is not necessary.
(5) The effect of pitting on silty clay loam soil may be short-lived due to the fact the pits will silt up and seal over and become less effective.

Other methods of range treatment such as chiseling, contour furrowing, and pitting with eccentric one way disk have been used in the area. There has been some success with each of these treatments in this area as well as in other areas. The main objection to these treatments is that they do not satisfactorily treat the so-called hardpan which slows up the recovery of range. However, as shown by Barnes in a 10-year study in Wyoming, pitted areas (eccentric disk) produced 9 pounds more of lamb per area than untreated areas and also carried 22 percent more sheep.

This increase of production in Wyoming was made during a more favorable climatic period than at present. However, the ranchers of the Central Colorado Soil Conservation District recognize this situation, and are moving forward as indicated by their progress of pitting about 6,000 acres in 1955 with plans for an equal or greater acreage in 1956.

ARBOR DAY IN NEBRASKA. — Some 18,000 trees were planted by fifth-grade pupils in Nebraska on Arbor Day, April 22. As a project of the Nebraska Junior Chamber of Commerce, each pupil planted two trees, each carrying a metal tag giving the name of the pupil who planted the tree. Merchants and businessmen in the town where the trees were planted will pay the cost of this project. A prize will be awarded to the school with the highest survival rate of trees at the end of 1 year.

CONSERVATION RANCHING IN NEW MEXICO

By RALPH G. MILLER

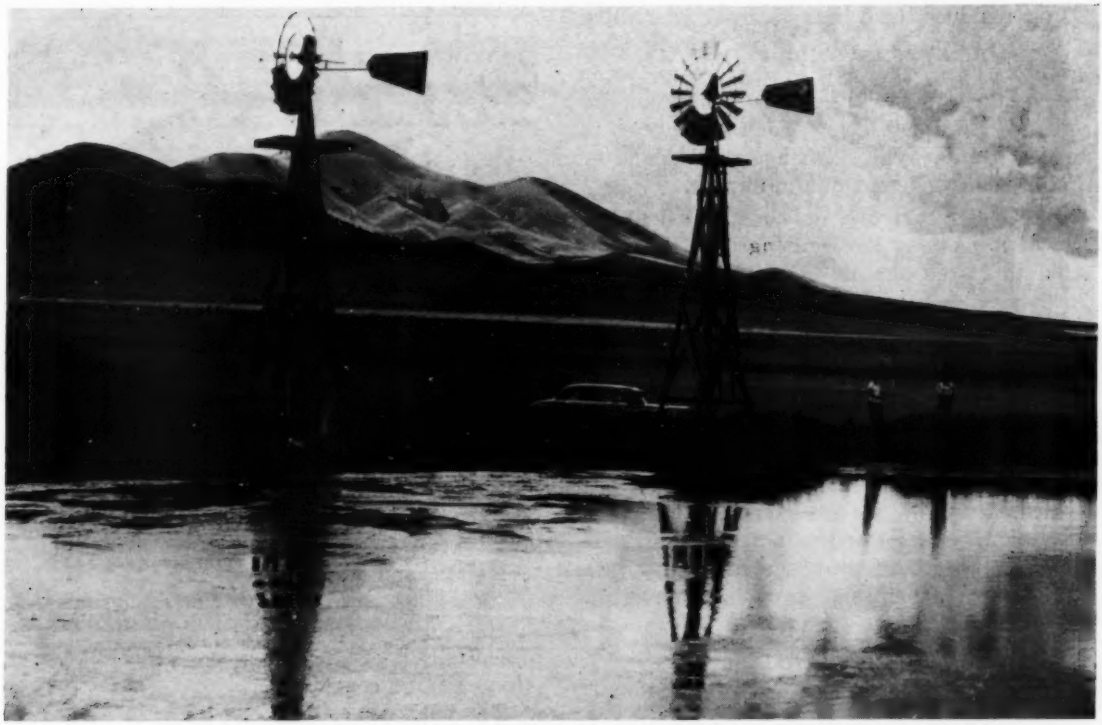
"PROPER land use and good soil and water conservation practices have gone a long way toward making the business of ranching a success," declares E. E. Salyer, Colfax County, New Mex., rancher.

The Salyers, who came from Texas, homesteaded 320 acres in the Malpie community in 1911. They made their living largely from dryland farming until the early thirties. In 1914, Salyer established the Malpie post office and store. At that time, about 75 farmers lived in the community. Most of them made a living by cultivating about 100 acres of dry cropland, using horse and mule power.

During the thirties and early forties, the Salyers enlarged their land holdings to the present 5,000 acres of rangeland and 500 acres of dry cropland. A large measure of their success can be attributed to conservation.

Note.—The author is work unit conservationist, Soil Conservation Service, Raton, New Mex.

E. E. Salyer and one of his herd bulls.



A large pond on the Salyer ranch with windmills to pump water for livestock and garden irrigation.

They have consistently followed a system of stocking according to the capabilities of the range and reducing or fluctuating livestock numbers in dry years.

For the last 14 years they have followed the practice of range deferment on one of the pastures by excluding all livestock during the summer growing season. This pasture is used only by cows with calves during the spring calving season, thus providing a strong fully matured range feed at this time of important cattle management operations. The average calf weights for 1954, one of the driest years on record, were about 410 pounds for calves 6½ to 7 months old.

By paying attention to proper use of range forage and proper stocking, the Salyers have improved and maintained a good range, even during the recent severe droughts. On the "mountain pasture" of the ranch there now is a mixture of the better varieties of forage grasses, such as western wheat, big bluestem, little bluestem, Indian grass, Arizona fescue, mountain muhly, pine dropseed, and blue grama. About 80 percent of the pasture is made up of these good or desirable grasses. These species are not only highly desirable for forage production and soil conservation, but are the most efficient users of rainfall and snowfall.

The vigor of these better grasses is high as the growth pattern of individual grass plants is bunchy. In carrying out his soil and water conservation plan Sayler built or improved 11 stock water ponds. Some of the ponds were formed by new dams and others were improved by enlarging. Several wells were also drilled for livestock water. This combination of stock water dams and wells has done much to improve the distribution of cattle on the range.

Two and three-fourths miles of stock trails have been constructed to make grazing more accessible to the rougher parts of the mountain pastures.

About 2½ miles of erosion control ditches and dikes have been constructed for control of runoff and spreading of floods on natural grasslands. Two miles of terraces have been constructed on dry croplands to conserve water and control water erosion.

Crop residues have been maintained on dry cropland during the winter and spring blow seasons, where possible. In dry years, when inadequate crop residues were produced, dry croplands were emergency tilled or chiseled to prevent wind erosion. Damage to cropland by wind erosion was kept to a minimum.

An erosion control dam constructed at the head of a vega, or key grazing area, has protected this area against erosion and siltation. Floodwaters here were controlled so that they could be spread over the vega.

One farm fishpond has been developed.

About 1 acre of trees for a farm windbreak has been established.

In addition to the above practices, it is planned to seed to native range grasses some of the dry croplands that are unsuitable for continued cultivation. Several hundred acres of abandoned croplands now used as rangelands have been range pitted or chiseled for improvement of moisture infiltration.

Deferred grazing, as shown at the left, greatly increased forage production on the Salyer ranch.

Salyer has served on the State Soil Conservation Committee of New Mexico for a number of years, and at one time was chairman of that committee. He has also been on the board of supervisors of the Eastern Colfax Soil Conservation District for the past 5 years.

REVIEWS

FARM SOILS: THEIR FERTILIZATION AND MANAGEMENT. By Edmund L. Worthen and Samuel R. Aldrich. 5th edition. 439 pp. Illustrated. 1956. New York: John Wiley & Sons, Inc. $4.96.

This is an excellent book. The authors deal with both the principles and practices of soil management in simple terms for students and farmers who may have had no previous experience in either chemistry or soil science. Technical terms are held to an amazingly low minimum for so accurate a book. It explains the principal characteristics and qualities of soil that determine their responses to different practices and combinations of practices for efficient, sustained crop production. Although a 5th edition under a well known title, this is essentially a new book and considerably better than its predecessors.

The book deals primarily with the soil management practices and systems for the humid, temperate northeastern one-quarter of the United States, roughly east of the Great plains and north of the cotton line. It will we useful but less specific for those living in other parts of the United States.

This reviewer likes the balanced discussions of practical soil management practices and of the principles that underlie them. Soil conservation is conceived as an integral part of the soil management system for a field or farm. The reasons for the basic differences among the different kinds of soil are explained and related to a discussion of practices.

The book is well illustrated and contains useful suggestions to the high school teachers for field studies, including special soil judging schools and farm selection. Besides being useful as a text in high schools or in more advanced schools where practical soil science is scheduled before chemistry, the book will be useful for farmers and others. It is a good refresher book for those who have studied chemistry and soil science a long time ago with few opportunities "to keep up" with these subjects since.

—CHARLES E. KELLOGG

AWARDS FOR MERITORIOUS SERVICE

By ROSS D. DAVIES

A JOINT project in South Dakota of the State Soil Conservation Committee and State Association Soil Conservation Districts board of directors has met with initial success this year. These two groups worked out a plan of certificates of award for meritorious service to soil conservation district supervisors.

These certificates are awarded on recommendation by local boards of supervisors to district supervisors who have faithfully served their district over a period of years. The plan provides a green seal on the certificate for a minimum of 6 years' service, a red seal for 12 years, and a gold seal for 18 years' service.

It is more than just a length of service award. The inscription on the certificate reads:

"Certificate of Award—Presented to.....Name..... In Appreciation of Public Spirited Service to His Community, State and the Nation as a Supervisor of the .....Name..... Soil Conservation District During the Period .....19.... to .....19....."

Each certificate carries three signatures. It is signed by the chairman, State Soil Conservation Committee; chairman, State Association Soil Conservation Districts; and chairman, local Soil Conservation District.

The record as of April 1, 1956 shows 5 gold seal, 59 red seal, and 135 green seal certificates have been awarded. They have usually been framed and presented at some public function. Many were presented at annual district cooperator banquets or meetings and served as a valuable basis for discussing the district program and furthering district objectives.

Note.—The author is state conservationist, Soil Conservation Service, Huron, S. Dak.

Three supervisors of the Clearfield-Keyapaha Soil Conservation District, S. Dak., with their 18-year certificates of award. They are: (left to right) Clyde H. Sargent, Dennis B. Lyons, and Walter C. Hellman.

Three of the first five supervisors to receive 18-year awards were from one district, the Clearfield-Keyapaha Soil Conservation District. These three men—Clyde H. Sargent, Winner; Dennis B. Lyons and Walter C. Hellman, both of Millboro, received their certificates at a public recognition meeting at Winner on April 2, 1956.

Another 18-year certificate winner is Joseph Heimer, Dupree, a supervisor in the Tri-County District at Faith. The late Frank Feser of the Brown-Marshall Soil Conservation District, Hecla, was the other recipient of an 18-year certificate. When the certificate was presented to him a few days before he passed away on January 19, he stated: "This certificate means more than most any honor I have ever received because it shows that I have tried to help my district."

CONSERVATION PAYS.—A survey of farms in the Coon Creek watershed of western Wisconsin, site of the first erosion control demonstration project in the United States, by H. O. Anderson and P. E. McNall, University of Wisconsin farm management specialists, proves that conservation is profitable.

Since the erosion control program began in 1933, almost half of the farmers of LaCrosse, Vernon, and Monroe counties have adopted soil conservation practices, according to Anderson and McNall.

There were about 3,600 farmers in the program at the end of 1954. This is an increase from 200 farmers who pioneered the Coon Creek watershed project in 1934. Many of the farms not actively under the soil conservation program have also joined in conservation practices, the agricultural economists say.

Anderson and McNall found that some soil conservation practices have been more readily adopted than others. Contour stripcropping and terraces have been taken up faster than all other practices. This, according to the farm management specialists, is because these practices fit best into the farmers normal production program.

About 85 percent of participating farmers grow legume hay compared to 75 percent of all farmers in the area.

For this study, Anderson and McNall classified conservation program farms into three categories—high score, medium score, and low score conservation farms according to the number of practices adopted. They compared production and income of the high and low farms to show the effect of conservation.

Corn and oat yields were 21 percent higher on the high conservation farms than on the low. Hay yields were 9 percent higher than on the low farms.

High conservation farms also had more livestock production. More corn and grain made possible greater production of hogs and poultry.

High conservation farms had 3 more cows per herd and sold about 800 pounds more butterfat than low farms. The high farms sold almost 600 pounds more beef, 1½ tons more pork, and 500 dozen more eggs.

Increased production brought in more money on the high conservation farms too, Anderson and McNall say. Average total cash income was 10 percent higher.

CORDWOOD FROM WILDLIFE MARSH. — Henry Erikson of West Acton, Mass., has taken advantage of the open winter to cut the cordwood off his wildlife marsh. Erikson holds the water up over this marsh in order to get a good coating of ice to aid in harvesting the cordwood. He trucks the wood off the marsh as it is cut so that there is no danger of losing it in case of a thaw or heavy snow. He seems to manage to make these land improvements in such a way that he has little or no out-of-pocket expense. The marsh has already attracted large numbers of waterfowl and should improve now that the wood has been removed. Erikson will realize enough out of his cordwood sales to pay nearly all the expense of building this marsh.

WISE SOIL MANAGEMENT NEEDED.—In early times, farmers could keep going west to mine the virgin fertility of new soils to grow more corn. But now fields are no longer the equivalent of open pasture for crops where seeds are turned out in the spring to rustle for themselves like cows on the range.

Bigger and better crops are not necessarily a matter of more and newer acres. Today's top yields are a result of wise soil management that guarantees an adequate supply and a good balance of plant nutrients.

—W. A. Albrecht
Chairman, Department of Soils
University of Missouri

SOIL CONSERVATION

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